A STUDY OF SERIES OF CASES OF MESH HERNIOPLASTY FOR INGUINAL HERNIAS

DISSERTATION SUBMITTED FOR M.S. GENERAL SURGERY
DEGREE EXAMINIATION

TIRUNELVELI MEDICAL COLLEGE HOSPITAL,
TIRUNELVELI.

MARCH - 2009

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY,
CHENNAI, TAMILNADU

ACKNOWLEDGEMENT

I whole – heartedly thank with gratitude ***THE DEAN***, Tirunelveli Medical College, Tirunelveli, for having permitted me to carry out this study at the Tirunelveli Medical College Hospital.

My special thanks goes to ***Prof. Dr. Jeyakumar Sagayam, M.S.,*** Professor and Head, Department of surgery, Tirunelveli Medical College, and my unit chief, ***Prof. Dr.K.Parimalam***, ***M.S.,*** for their guidance throughout the period of my study. I am grateful to ***Prof. Dr.Thangaiah, M.S., Prof. Dr.Paulus D.Prakash, M.S., Prof. Dr.Ravindaran, M.S., Prof. Dr. Balaji, M.S., and Prof. Dr.Janakiraman, M.S.,*** for their immense help and guidance.

I remain ever grateful to ***Prof. Dr.A.Chidambaram,M.S.,*** for his constant source of encouragement and inspiration for the smooth completion of this study.

I am grateful for the guidance and encouragement of my Assistant Professors, ***Dr.J.Rakesh Fernando,M.S., Dr.S.Sivanupandian,M.S., Dr.K.Rajkumar, M.S., Dr.Alex Arthur Edwards, M.S., Dr.Pabitha Devi, M.S., Dr.Raju, M.S.,***and other assistant professors.

I sincerely acknowledge the help and assistance rendered by my fellow postgraduates. Last but not the least; I thank all the patients for their kind co-operation in carrying out the study successfully.

CONTENTS

INTRODUCTION

A hernia is defined as an area of weakness or complete disruption of the fibromuscular tissues of the body wall. Structures arising from the cavity contained by the body wall can pass through, or herniate, through such a defect. While the definition is straightforward, the terminology is often misrepresented. It should be clear that *hernia* refers to the actual anatomic weakness or defect, and *hernia contents* describe those structures that pass through the defect.

Hernias are among the oldest known afflictions of humankind, and surgical repair of the inguinal hernia is the most common general surgery procedure performed today. Despite the high incidence, the technical aspects of hernia repair continue to evolve.

AIM OF THE STUDY

To Evaluate Clinically The Outcome Of Mesh Hernioplasty for Inguinal Hernias in Terms of Operation Time, Patient Comfort, Hospital Stay, Return to Work and Post Operative Complications -with special reference to surgery done by trainee surgeon.

HISTORICAL REVIEW

The word "hernia" is derived from a Latin term meaning "a rupture." The earliest reports of abdominal wall hernias date back to 1500 BC. During this early era, abdominal wall hernias were treated with trusses or bandage dressings. The first evidence of operative repair of a groin hernia dates to the first century AD. The original hernia repairs involved wide operative exposures through scrotal incisions requiring orchiectomy on the involved side. Centuries later, around 700 AD, principles of operative hernia repair evolved to emphasize mass ligation and en bloc excision of the hernia sac, cord, and testis distal to the external ring. The first report of groin hernia classification based on the anatomy of the defect (ie, inguinal versus femoral) dates to the 14th century, and the anatomical descriptions of direct and indirect types of inguinal hernia were first reported in 1559.

Bassini revolutionized the surgical repair of the groin hernia with his novel anatomical dissection and low recurrence rates. He first performed his operation in 1884, and published his initial outcomes in 1889. Bassini reported 100% follow-up of patients over a 5-year period, with just 5 recurrences in over 250 patients. This rate of recurrence was unheard of at the time and marked a distinct turning point in the evolution of herniorraphy. Bassini's repair emphasizes both the high ligation of the hernia sac in the internal ring, as well as suture reinforcement of the posterior

inguinal canal. The operation utilizes a deep and superficial closure of the inguinal canal. In the deep portion of the repair, the canal is repaired by interrupted sutures affixing the transversalis fascia medially to the inguinal ligament laterally. This requires an incision through the transversalis fascia. The superficial closure is provided by the external oblique fascia.

In addition to Bassini's contributions, the first true Cooper's ligament repair, which affixes the pectineal ligament to Poupart's ligament and thereby repairs both inguinal and femoral hernia defects, was introduced by Lotheissen in 1898. McVay further popularized the Cooper's ligament repair with the addition of a relaxing incision to reduce the increased wound tension.

The advances in groin hernia repair in the century following Bassini have shared the primary goal of reducing long-term hernia recurrence rates. To this end, efforts have been directed at developing a repair that imparts the least tension on the tissues that are brought together to repair the hernia defect. Darn repairs were first introduced in the early 20th century to reduce wound tension by using either autologous tissue or synthetic suture to bridge the gap between fascial tissues. Muscle and fascial flaps were attempted without consistent success. In 1918, Handley introduced the first use of silk as a prosthetic darn and nylon followed several years later. However, it was found that heavy prosthetic material increased the risk of wound infection, and the silk suture ultimately lost its strength over

time. The use of autologous or synthetic patches was also attempted in order to reduce wound tension and improve rates of recurrence. The first patches, beginning in the early 20th century, consisted of silver wire filigree sheets that were placed along the inguinal canal. Over time, the sheets suffered from metal fatigue leading to hernia recurrence. Reports of the wire patches eroding into adjacent inguinal structures and even the peritoneal cavity itself caused even more concern with this technique. The modern synthetic patch, made of a plastic monofilament polymer (polyethylene), was introduced by Usher in 1958. Lichtenstein, who developed a sutureless hernia repair using a plastic mesh patch placed across the inguinal floor, further popularized this technique.

In the search for a technical means to reduce recurrence, emphasis was also placed on a meticulous dissection that would avoid placement of a prosthetic mesh. The most popular version was the Shouldice technique, initially introduced in 1958, and in essence a modification of the Bassini operation. This technique involves meticulous dissection of the entire inguinal floor and closure of the inguinal canal in four layers. The transversalis fascial layer itself is closed in two layers, as opposed to the single layer of interrupted suture advocated by Bassini. While the operation can be technically challenging to the beginner, it has been associated with excellent long-term outcomes and low recurrence rates.

Today, laparoscopic techniques have been validated as safe and effective in

the treatment of groin hernias. The laparoscopic approaches were initially developed in the early 1990s as laparoscopic techniques diffused throughout other specialties of general surgery

ANATOMY OF THE INGUINAL CANAL

The inguinal canal in the adult is an oblique rift in the lower part of the anterior abdominal wall. It measures approximately 4 cm in length. It is located 2 to 4 cm above the inguinal ligament, between the opening of the external (superficial) and internal (deep) inguinal rings.

The boundaries of the inguinal canal are as follows:

Anterior: The anterior boundary is the aponeurosis of the external oblique muscle and, more laterally, the internal oblique muscle.

Posterior: In about ¾ of subjects, the posterior wall is formed laterally by the aponeurosis of the transversus abdominis muscle and the transversalis fascia; in the remainder, the posterior wall is transversalis fascia only. Medially the posterior wall is reinforced by the internal oblique aponeurosis.

Superior: The roof of the canal is formed by the arched fibers of the lower edge of the internal oblique muscle and by the transversus abdominis muscle .

Inferior: Inferior wall of the canal is formed by the inguinal ligament

(Poupart's) and the lacunar ligament (Gimbernat's).

The boundaries of the rings are as follows:

External ring: There is a triangular opening of the aponeurosis of the external oblique, the base being part of the pubic crest with the margins formed by two crura, superior (medial) and inferior (lateral). The superior crura is formed by the aponeurosis of the external oblique itself; the inferior crura is formed by the inguinal ligament. .

Internal ring: The boundaries of this ring, which is an inverted "V" -or "U"-shaped normal defect in the transversalis fascia, are not so simple. The arms of the ∧, anterior and posterior, are a special thickening of the transversalis fascia, forming a sling. The inferior border is formed by another thickening of the transversalis fascia —the iliopubic tract— which is not always very aponeurotic.

The inguinal canal contains, in males, the spermatic cord, or in females, the round ligament of the uterus.

According to Madden, the "piriform fossa" forms part of the posterior wall ("floor") of the inguinal canal. This region is a semi-ovoid space filled with fibrofatty tissue, located at the medial part of the floor. The piriform fossa is bounded as follows

Superior: Iliopubic tract (which inserts into Cooper's ligament)

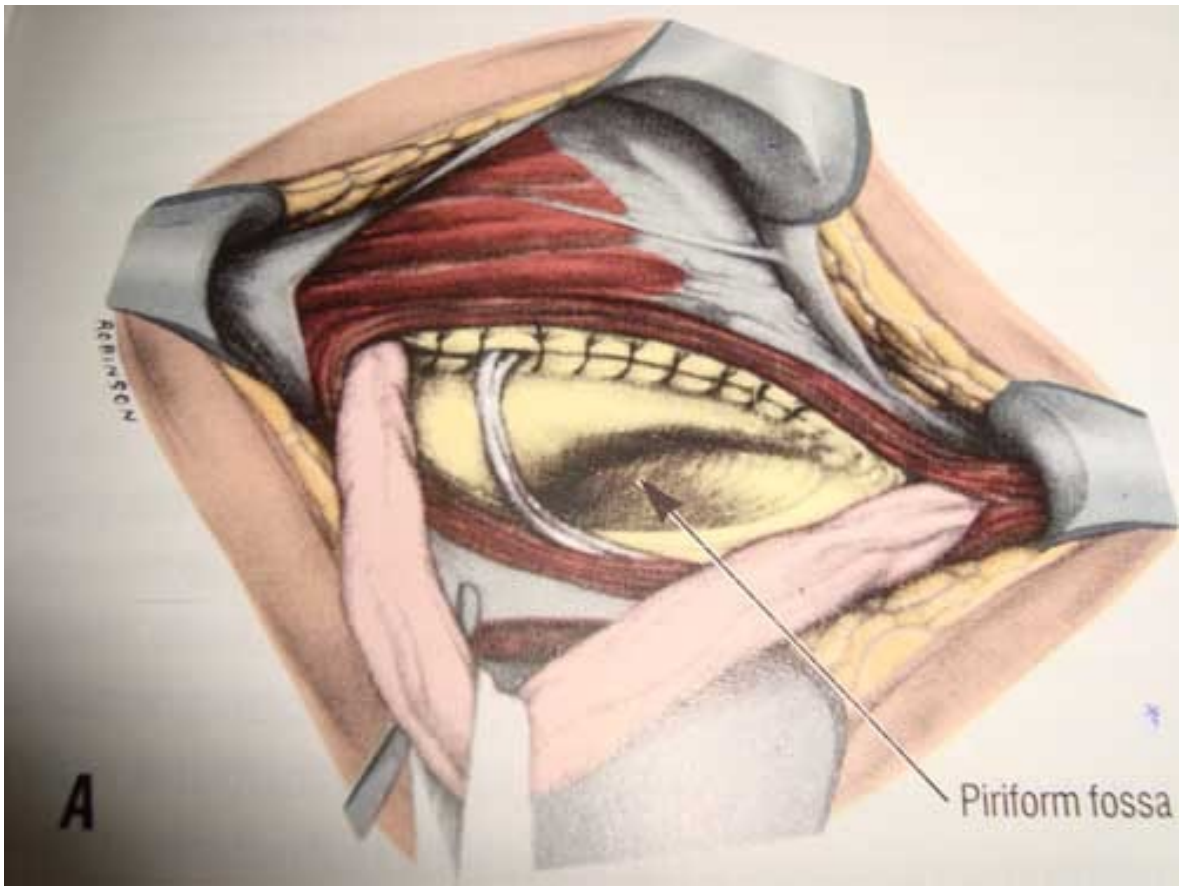
Inferior: Shelving edge of inguinal ligament

Lateral: Medial wall of femoral sheath

Medial: Ligament of Gimbernat

"Floor": Ligament of Gimbernat

PIRIFORM FOSSA



Fruchaud believed that all hernias of the groin begin within the groin, in an area he named the myopectineal orifice. This area in the groin is bounded as follows:

Superior: Arch of internal oblique muscle and transversus abdominis muscle

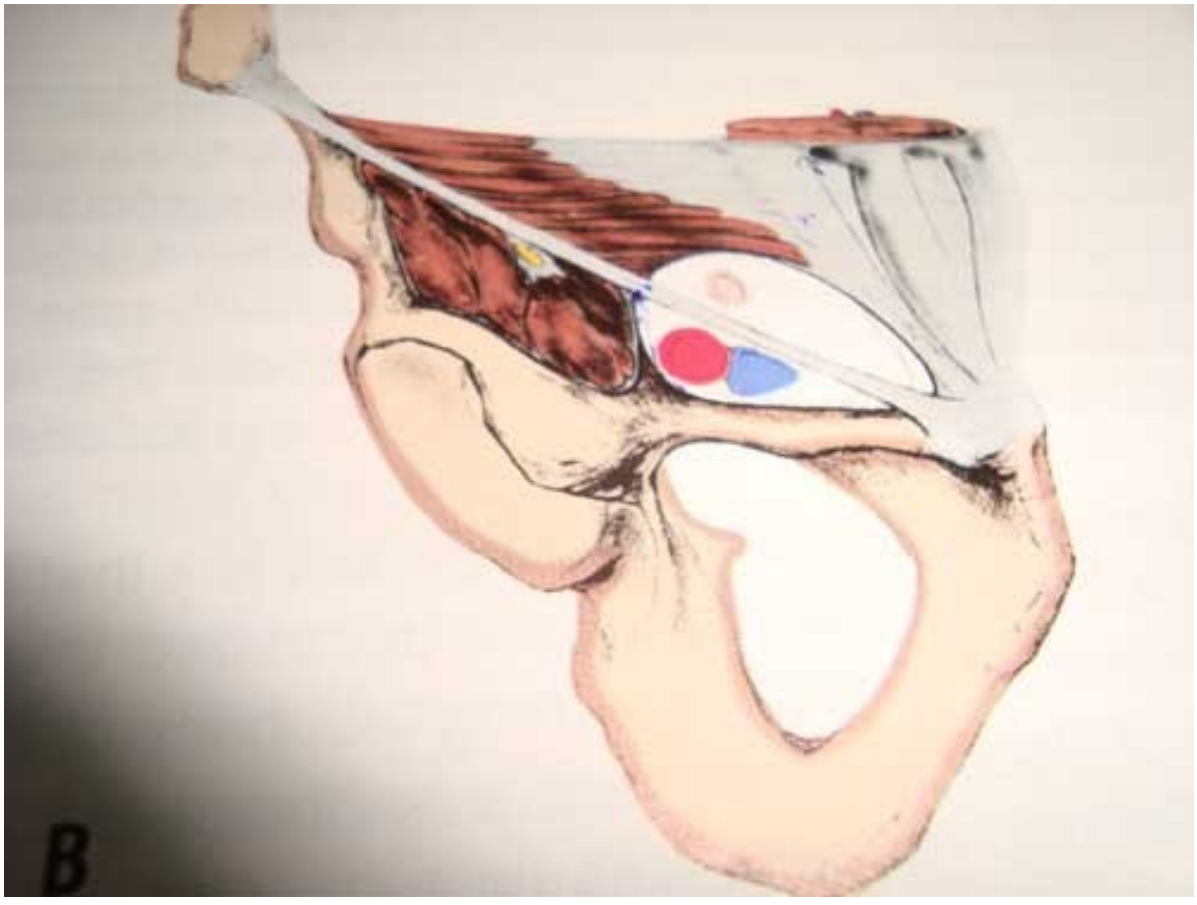
Lateral: Iliopsoas muscle

Medial: Lateral border of rectus muscle and its anterior lamina

Inferior: Pubic pectin

The inguinal ligament spans and divides this framework. The area is traversed by the spermatic cord and femoral vessels and is covered on its inner surface solely by the transversalis fascia.

MYOPECTINEAL ORIFICE OF FRUCHAUD



SUPERFICIAL FASCIA

The superficial fascia is divided into a superficial fatty part (Camper's fascia) and a deep membranous part (Scarpa's fascia). The adipose layer continues downward and laterally into the thigh, gluteal region, and perineum and upward over the anterior abdominal wall and thoracic region. The membranous layer of Scarpa is continuous upward with the fatty layer in the pectoral region, forming the anterior boundary of the retromammary space. Inferiorly, it attaches to the fascia lata of the thigh below the inguinal crease. It is also attached superolaterally to the iliac crest.

DEEP FASCIA

The deep muscular fascia of the anterior wall (known as the fascia innominata or Gallaudet's fascia) is continuous over the shaft of the penis or clitoris, forming their deep fascial investment. There they are known as Buck's fascia.

INGUINAL LIGAMENT

The lower edge of the external oblique aponeurosis extends from the anterior superior iliac spine to the pubic tubercle. This is the inguinal ligament (ligament of Poupart). The ligament is related laterally to the iliopsoas muscle and

its fascia. It is related medially to the femoral vessels. The ligament is also related indirectly to the femoral ring, to the iliopubic tract, and to other thickenings of the transversalis fascia.

Aponeurosis and Fascia of the External Oblique Muscle as Related to the Groin

The external oblique muscle is not present in the groin area. Only its aponeurosis extends downward and medially, to pass anterior to the rectus muscle. Here, it also joins the aponeurosis of the internal oblique muscle and that of the transversus abdominis to form the anterior layer of the rectus sheath. Between this attachment and an inferior attachment to the pubic bone lies a triangular hiatus (superficial inguinal ring) through which passes the spermatic cord or the round ligament. The innominate fascial covering of the external oblique muscle travels further downward and forms the external spermatic fascia of the spermatic cord.

CONJOINED AREA (TENDON)

Buried among the names of structures real or imaginary in the inguinal region is the term conjoined tendon. If one consults a medical dictionary, one finds that anatomists decided in 1895 that it should be called the falx inguinalis. At the time of this decision, inguinal anatomy was still developing.

The conjoined tendon is, by definition, the fusion of lower fibers of the internal oblique aponeurosis with similar fibers from the aponeurosis of the transversus abdominis where they insert on the pubic tubercle and superior ramus of the pubis. What is used in the operating room for the repair of an inguinal hernia is the transversus abdominis aponeurosis, the transversalis fascia, and the lateral edge of the rectus sheath. Occasionally, the internal oblique muscle, the internal oblique aponeurosis, the falx inguinalis (in the original sense), the ligamentum interfoveolare, or the reflected inguinal ligament is used. None of these are "conjoined," but there is a tendency among surgeons to use the term for any mass of fascia or aponeurosis from the internal oblique or the transversus abdominis muscles.

Since several structures are juxtaposed in this area and the term "conjoined" is widely used, Gray and Skandalakis proposed that the concept of the area of the conjoined tendon should be renamed the "conjoined area".The area can be identified easily by the inexperienced surgeon who understands that it is occasionally tendinous. In other words, this is the area in which there would be a conjoined tendon if there were a conjoined tendon. We believe our suggestion will accommodate both the myth and the facts.

LIGAMENT OF GIMBERNAT (LACUNAR LIGAMENT)

The ligament of Gimbernat is a triangular extension of the inguinal ligament before its insertion upon the pubic tubercle. It is inserted at the pecten pubis, and its lateral end meets the proximal end of the ligament of Cooper. The lacunar ligament was first described by Antonio de Gimbernat in 1793. According to Madden, the ligament can be demonstrated only when "the piriform fossa is completely exposed," since it practically forms the floor of the fossa.

COOPER'S LIGAMENT (PECTINEAL LIGAMENT)

Almost 200 years ago, Sir Astley Cooper described this "ligament According to Nyhus and Bombeck, "Periosteum of the pelvis ...is intimately fused with another condensation of the transversalis fascia and iliopubic tract to form Cooper's ligament."According to McVay, the ligament is the periosteum of the superior ramus of the pubis lateral to the pubic tubercle, where the inferior aponeurosis of the transversus abdominis is inserted.

Cooper's ligament consists of:

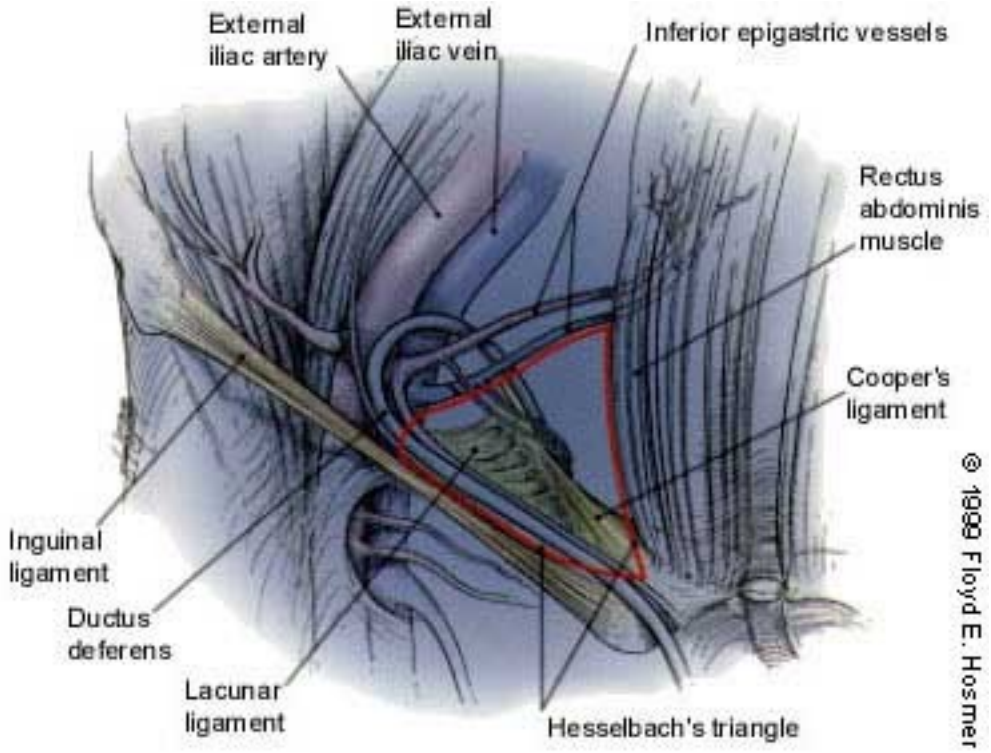
Periosteum of the pectineal line

Insertion of the iliopubic tract from above to the periosteum

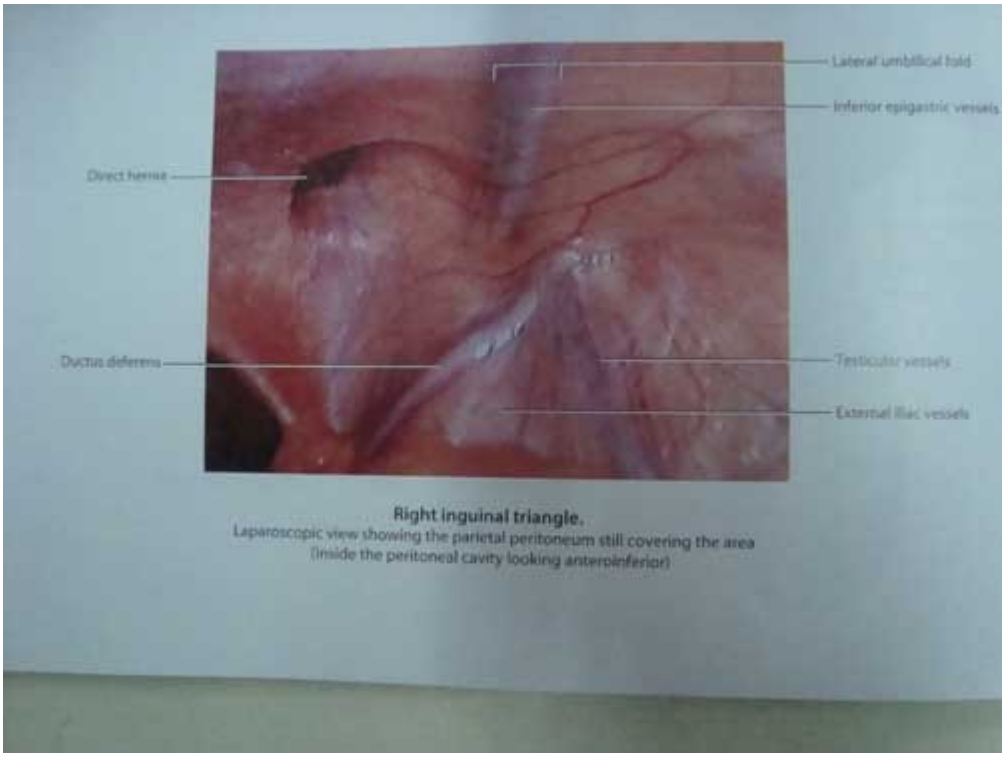
Insertion of the lacunar ligament from below to the periosteum

Origin of the pectineus tendon from below .

ANATOMY OF INGUINAL CANAL



LAPAROSCOPIC VIEW



Right inguinal triangle.
Laparoscopic view showing the parietal peritoneum still covering the area (inside the peritoneal cavity looking anteroinferior)

ANATOMY OF THE INGUINAL REGION AND THE ANTERIOR ABDOMINAL WALL FROM A LAPAROSCOPIC PERSPECTIVE

The laparoscopic surgeon does not have the luxury of direct palpation and therefore must rely heavily on visual cues. Therefore, a detailed understanding of the anatomy of the peritoneal aspect of the anterior abdominal wall and deep inguinal region is essential for the safe and effective performance of laparoscopic hernia repairs.

The parietal peritoneum of the anterior abdominal wall forms folds on top of certain preperitoneal structures, which are referred to as ligaments. The median umbilical ligament lies in the midline, extending from the bladder fundus to the umbilicus. This structure contains the urachus, which is a remnant of the fetal allantois. The obliterated fetal umbilical arteries create the paired medial umbilical ligaments on each side of the midline. Both the artery and the urachus may be patent. The lateral umbilical ligaments are formed by the underlying inferior epigastric vessels (IEV), which are enclosed by layers of transversalis fascia. Direct hernias occur in the medial fossa, which is bound by the medial and lateral umbilical ligaments. Indirect hernias occur lateral to the lateral umbilical ligament (lateral fossa) through the internal ring. Femoral hernias occur below the iliopubic tract just medial to the femoral vessels.

Deep to the peritoneum is the pre-peritoneal space. This potential space is bound by the peritoneum and the transversalis fascia and is commonly associated with two eponyms. The loose connective tissue between the pubis and the bladder/ anterior abdominal wall is called the retropubic space of Retzius. Bogros' space represents the lateral extension of the space of Retzius and contains anatomical structures critical to the laparoscopic surgeon.

The transversalis fascia is next. The importance of the transversalis fascia for the laparoscopic hernia surgeon is its derivatives or analogues namely the iliopectineal arch, iliopubic tract, and crura of the deep inguinal ring. The

iliopectineal arch is situated at the medial border of the iliacus muscle and is continuous with the fascia iliaca, the endoabdominal fascia covering the iliacus. The iliopectineal arch divides the vascular compartment containing the iliac vessels from the neuromuscular compartment containing the iliopsoas muscle, femoral nerve, and lateral femoral cutaneous nerve. The iliopubic tract is an aponeurotic band formed by the condensation of the anterior layer of transversalis fascia blended with the transverses abdominis aponeurosis. It attaches to the iliac crest superolaterally and inserts on the pubic tubercle medially. It serves as an important landmark in a laparoscopic preperitoneal dissection. Most of the branches of the lumbar plexus nerves run inferior to this tract, and aggressive dissection or use of fastening devices such as staples, tacks, or sutures placed through or inferior to the iliopubic tract can lead to nerve or vascular injury. The superior and inferior crura of the deep inguinal ring are also derived from the transversalis fascia. Cooper's (pectineal) ligament is formed by the thickened fibrous periosteum along the pectineal line of the pubis and fibers from the iliopubic tract as they merge with the inguinal ligament.

The IEVs, which supply the anterior abdominal wall, arise from the external iliac vessels before they pass under the inguinal ligament. The IEVs enter the rectus sheath at the level of arcuate line. These vessels give rise to two major branches of concern: the external spermatic vessel and the iliopubic branch, which anastomoses via the corona mortis (found in a third of patients) to the obturator

artery system. Damage to the corona mortis during dissection of or mesh fixation to Cooper's ligament can result in significant bleeding.

The nerve branches of the lumbar plexus that can be damaged during laparoscopic dissection vary in their course but generally lie in what is referred to as the "electrical hazard zone" (bordered medially by the spermatic cord, superiorly by the iliopubic tract, and laterally by the iliac crest). Electrocautery should not be used in this region. This area is also referred to as the "triangle of pain" by some authors, and contains (from lateral to medial) the lateral femoral cutaneous, the anterior femoral cutaneous, the femoral branch of the genitofemoral, and the femoral nerves.

Another area in which caution should be heeded is the area referred to as the "triangle of doom" (bordered by the vas deferens medially, gonadal vessels laterally, and peritoneal edge posteriorly), containing the external iliac vessels, the deep circumflex iliac vein, the femoral nerve, and the genital branch of the genitofemoral nerve.

The cord structures are formed at the internal ring when the internal spermatic vessels (pampiniform venous plexus and the testicular artery) and the genital branch of the genitofemoral nerve join the vas deferens. The identification of both the vas and the testicular vessels are important to the laparoscopic surgeon as adequate dissection of these structures is essential to assure that a large

prosthesis can be placed in the preperitoneal space without the possibility of roll-up. The urinary bladder also needs to be identified where it is located medial to the medial umbilical ligament.

AETIOLOGY

The indirect inguinal hernia, the most common form of groin hernia across all ages and both genders, is thought to be congenital in etiology. The processus vaginalis is the pocket of peritoneum that forms around the testicle as it descends through the internal ring and along the inguinal canal into the scrotum during the 28th week of gestation. The primary etiology behind the indirect inguinal hernia is believed to be a patent processus vaginalis, which in essence represents a hernia sac. In this way, the hernia defect is the internal ring itself, and the sac is preformed but never closes at the end of gestation. Once intra-abdominal contents find their way into the sac, an indirect inguinal hernia is formed.

It is likely, however, that every person with a patent processus vaginalis does not develop an inguinal hernia during his or her lifetime. Thus, other predisposing factors must aid in indirect inguinal hernia formation. It is commonly thought that repeated increases in intra-abdominal pressure contribute to hernia formation; hence, inguinal hernias are commonly associated with pregnancy, chronic obstructive pulmonary disease, abdominal ascites, patients who undergo peritoneal dialysis, laborers who repeatedly flex the abdominal wall musculature,

and individuals who strain from constipation. It is also thought that collagen formation and structure deteriorates with age, and thus hernia formation is more common in the older individual.

Several inborn errors of metabolism can lead to hernia formation. Specifically, conditions such as Ehlers-Danlos syndrome, Marfan's syndrome, Hunter's syndrome, and Hurler's syndrome can predispose to defects in collagen formation. There is evidence that cigarette smoking is associated with connective tissue disruption, and hernia formation is more common in the chronic smoker.

CLINICAL MANIFESTATIONS

The groin hernia can present in a variety of ways, from the asymptomatic hernia to frank peritonitis in a strangulated hernia. Many hernias are found on routine physical examination or on a focused examination for an unrelated complaint. These groin hernias are usually fully reducible and chronic in nature. Such hernias are still referred for repair since they invariably develop symptoms, and asymptomatic hernias still have an inherent risk of incarceration and strangulation.

The most common presenting symptomatology for a groin hernia is a dull feeling of discomfort or heaviness in the groin region that is exacerbated by straining the abdominal musculature, lifting heavy objects, or defecating. These

maneuvers worsen the feeling of discomfort by increasing the intra-abdominal pressure and forcing the hernia contents through the hernia defect. Pain develops as a tight ring of fascia outlining the hernia defect compresses intra-abdominal structures with a visceral neuronal supply. With a reducible hernia, the feeling of discomfort resolves as the pressure is released when the patient stops straining the abdominal muscles. The pain is often worse at the end of the day, and patients in physically active professions may experience the pain more often that those who lead a sedentary lifestyle.

Overwhelming or focal pain from a groin hernia is unusual and should raise the suspicion of hernia incarceration or strangulation. An incarcerated hernia occurs when the hernia contents are trapped in the hernia defect so that the contents cannot be reduced back into the abdominal cavity. The tight circumferential pressure applied by the hernia defect serves to impede the venous outflow from the hernia contents, resulting in congestion, edema, and tissue ischemia. Ultimately, the arterial inflow to the hernia contents is compromised as well, resulting in tissue loss and necrosis, termed strangulation of the hernia.

PHYSICAL EXAMINATION

As with any hernia, the groin hernia should be properly examined with the patient in the standing position. This allows the hernia contents to fill the hernia sac and make the hernia obvious on physical examination. Some hernias, however, may be easily identifiable in the supine position. It should be noted that the exact anatomical classification of the inguinal hernia (ie, indirect versus direct) is impossible to accurately predict based on physical exam alone.

In the male patient, using the second or third finger, the examiner should invaginate the scrotum near the external ring and direct the finger medial towards the pubic tubercle. The examiner's finger will thus lie on the spermatic cord with the tip of the finger within the external ring. The patient is then asked to cough or perform a Valsalva maneuver. A true inguinal hernia will be felt as a silk-like sensation against the gloved finger of the examiner. This is the infamous "silk glove" sign.

The female patient does not have the long and stretched spermatic cord to follow with the examiner's finger during the physical examination. Instead, two fingers can be placed along the inguinal canal, and the patient is asked to cough or strain. If present, the examiner should feel the sensation of the hernia sac against the gloved finger. Particular attention in the female patient should be paid to the

location of the sensation; femoral hernia sacs will present medial and just inferior to the lower border of the inguinal ligament.

INVESTIGATIONS

Hernia is a clinical diagnosis. One radiologic diagnostic tool is herniography which in some circumstances can help to avoid unnecessary surgical exploration. Ultrasound is useful but is highly operator dependent. The development of fast imaging MRI scanners that allow dynamic imaging (i.e.,imaging perfofmed during straining) shows particular promise.

RIGHT NVHUS - II

BILATERAL NYHUS - IIIA

NYHUS CLASSIFICATION OF GROIN HERNIA

Type I - Indirect Inguinal Hernia.

(Internal ring – normal)

Type II - Indirect Inguinal Hernia

(Internal ring dilated but posterior Inguinal wall intact &

Inferior deep epigastric vessels not displaced)

Type III - Posterior wall defect – A. – Direct Inguinal Hernia.

B – Indirect Inguinal Hernia

(Massive Scrotal, slider,

Pantaloon Hernia).

C – Femoral Hernia.

Type IV - Recurrent Hernia

LEFT HYHUS – III B

RIGHT NYHUS - IV

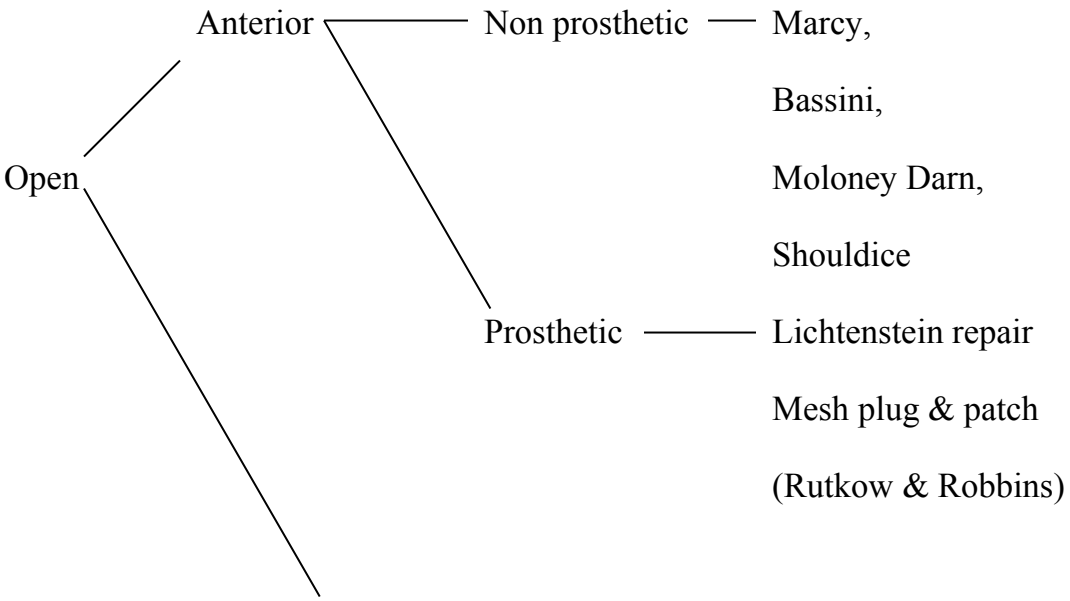
MANAGEMENT

The treatment of all hernias, regardless of their location or type, is surgical repair. Elective repair is performed to alleviate symptoms and to prevent the significant complications of hernias, such as incarceration or strangulation. While the limited data available on the natural history of groin hernias show that these complications are rare, the complications are associated with a high rate of morbidity and mortality when they occur. At the same time, the risks of elective groin hernia repair, even in the patient with a complicated medical history, are exceedingly low. Outcomes of surgical repair are generally excellent with minimal morbidity and relatively rapid return to baseline health.

The major risk with delayed surgical repair is the risk of incarceration and/or strangulation. It is not possible to reliably identify those hernias that are at an increased risk for these complications. It is known that the risk of incarceration of a hernia is greatest soon after the hernia manifests itself. This is likely due to the fact that at the early stage of the hernia, the defect is small and fits tightly around the hernia sac; therefore any contents that fill the sac may quickly become trapped within the hernia. Over time, the hernia defect stretches due to the tissue that enters and leaves the sac with changes in intra-abdominal pressure. After 6 months, the risk of hernia incarceration decreases from 5% per year to 1-2% per

year. In general, the larger the palpable defect on physical examination, the lower the risk of incarceration. Clearly, all risks of tissue loss aside, elective hernia repair is still preferred over emergent repair.

SURGICAL APPROACH TO HERNIAS



Preperitoneal Non Prosthetic (not popular)

Prosthetic ReadRives(Anterior approach)

Wantz/Stopppa(GPRVS)

(Posterior approach)

Nyhus (ilio pubic tract repair)

Combination anterior and preperitoneal prosthetic –Prolene hernia system

Laparoscopic TAPP (Trans Abdominal Preperitoneal Procedure)

TEP (Totally Extraperitoneal Procedure)

IPOM (Intra Peritoneal Onlay Mesh Procedure)

SURGICAL TECHNIQUES

Based on operative intent and approach, the many different hernia repair techniques can be grouped into four main categories.

GROUP 1: OPEN ANTERIOR REPAIR

Group 1 hernia repairs (Bassini, McVay and Shouldice techniques) involve opening the external oblique aponeurosis and freeing the spermatic cord. The transversalis fascia is then opened, facilitating inspection of the inguinal canal, the indirect space and the direct space. The hernia sac is usually ligated, and the canal floor is subsequently reconstructed.

The techniques in the open anterior repair group differ somewhat in their approach to reconstruction, but they all use permanent sutures to approximate the surrounding fascia and repair the floor of the inguinal canal. When performed by skilled surgeons, these repairs provide reliable, satisfactory results and have similar recurrence rates. With very large defects or with fascia of marginal quality, the tension of the sutures can lead to recurrence.

The techniques in group 1 are all well suited to the use of local anesthesia.

GROUP 2: OPEN POSTERIOR REPAIR

Posterior repair (iliopubic tract repair and Nyhus technique) is performed by dividing the layers of the abdominal wall superior to the internal ring and entering the properitoneal space. Dissection then continues behind and deep to the entire inguinal region.

Like the anterior approach, the posterior approach provides excellent visualization of the areas of concern in herniorrhaphy. The major difference between this technique and the anterior approach is that reconstruction is performed from the "inside."

Excellent results have been reported for the posterior techniques, but problems related to suture tension remain.

Posterior repair is often used for hernias with multiple recurrences, because the approach avoids scar tissue from previous surgeries. It is probably best performed with the patient receiving regional or general anesthesia.

GROUP 3: TENSION-FREE REPAIR WITH MESH

The group 3 hernia repairs (Lichtenstein and Rutkow techniques) use the same initial approach as open anterior repair. However, instead of suturing the

fascial layers together to repair the hernia defect, the surgeon uses a prosthetic, nonabsorbable mesh. This mesh allows the hernia to be repaired without ten sion being placed on the surrounding fascia. Excellent results have been achieved with this approach, and reported recurrence rates have been less than 1 percent.

Some concern exists about the long-term safety of implanted prosthetic material, particularly the potential for infection or erosion. However, extensive accumulated experience with the hernia mesh has begun to alleviate many of these concerns, and tension-free repair continues to gain popularity.

Tension-free repair can be performed using any type of anesthesia. This approach is well suited for outpatient herniorrhaphy performed with the patient receiving local anesthesia.

GROUP 4: LAPAROSCOPIC PROCEDURES

Laparoscopic hernia repair has become increasingly popular in the past few years, but the technique has also sparked significant controversy. Early in the development of the technique, hernias were repaired by placing a large piece of mesh over the entire inguinal region on top of the peritoneum. This approach was abandoned because of the potential for small-bowel obstruction and fistulae development caused by the exposure of bowel to mesh.

Today, most laparoscopic herniorrhaphies are performed using either the transabdominal preperitoneal (TAPP) approach or the total extraperitoneal (TEP) approach. The TAPP approach involves placing laparoscopic trocars in the abdominal cavity and approaching the inguinal region from the inside. This allows the mesh to be placed and then covered with peritoneum. While the TAPP approach is a straightforward laparoscopic procedure, it requires entrance into the peritoneal cavity for dissection. Consequently, the bowel or vascular structures may be injured during the procedure.

In the TEP approach, an inflatable balloon is placed in the extraperitoneal space of the inguinal region. Inflation of the balloon creates a working space. For most surgeons, the TEP approach to hernia repair is more technically demanding than the TAPP approach.

In both the TAPP and TEP approaches, the hernia sac is reduced, and a large piece of mesh is placed to cover the indirect, direct and femoral areas of the inguinal region. The mesh is held in place by metal staples.

The advantage of these two procedures is that the small laparoscopic incision causes less pain and disability, promoting a faster return to work. This advantage appears to be most notable in patients who do heavy manual labor. Another advantage of the TAPP and TEP approaches is that bilateral hernias may be repaired simultaneously with no apparent increase in morbidity. Finally, these

approaches can be particularly effective in patients with hernia recurrence after traditional open herniorrhaphy. In such patients, additional open anterior repairs have a higher failure rate and an increased rate of complications. The laparoscopic approach, similar to the open posterior approach, allows hernia repair to be performed in a previously untouched space. Early results for laparoscopic surgery are promising, but information on long-term outcomes is currently unavailable. At present, the major drawbacks laparoscopic herniorrhaphy are the cost of the laparoscopic equipment, the need for general anesthesia and the absence of long-term follow-up data.

Anesthesia

Hernia repair may be performed using general, regional (spinal/epidural) or local anesthesia. Several studies have found that, with proper preoperative preparation, more than 90 percent of groin hernias can be repaired with patients receiving only a local anesthetic. The advantages of local anesthesia include the very short recovery time and the ability to test the repair intraoperatively with a Valsalva maneuver. Use of local anesthesia also avoids the respiratory and immune depressive effects of general anesthesia. This advantage is particularly important in elderly and frail patients.

Local anesthesia alone does not allow for comfortable and technically optimal herniorrhaphy in patients with a very high anxiety level. Either general or regional (spinal) anesthesia may be used in these patients. General anesthesia

provides the most comfort, but it has the highest risk. Patients occasionally respond poorly to a general anesthetic and require overnight hospitalization because of nausea, excessive sedation or urinary retention.

Spinal anesthesia provides excellent pain control during herniorrhaphy, and it carries slightly less risk than general anesthesia. The disadvantages of spinal anesthesia include the time required for the anesthetic to be placed and the possibility of incomplete sensory blockade. Urinary retention or a delay in the return of normal lower extremity sensation may mandate overnight observation following herniorrhaphy performed with regional anesthesia.

RESULTS OF HERNIA REPAIRS AT

SPECIALTY CENTERS

Author	Type of Repair	Number of patients	Follow up period	Complication rate (%)	Hernia recurrence rate (%)
Rutlege	McVay	906	9 years	NR	2.0
Welsh and Alexander	Shouldice	214,919	1 month to 40 years	NR	0.1
Amid , et al.	Shouldice	2,748	35 years	NR	1.5
	Lichtenstein	3,250	Average of 4 years (1 to 8 years)	NR	0.1
Rutkow and Robbins	Rutkow	2,060	NR	0.3	0.1
Nyhus	Posterior iliopublic tract repair	1,200	37 years		1 to 6

Felix, et al.	TAPP	733	Average of 24 months (1 to 44 months)	13.0	0.3
	TEP	382	Average of 9 months (1 – 44 months)	11.0	0.3

NR - Not reported

RESULTS OF HERNIA REPAIRS AT

NONSPECIALTY CENTERS

Author	Type of Repair	Number of patients	Follow up period	Complication rate (%)	Hernia recurrence rate (%)
Panos, et al.	McVay	136	Average of 3 years (1 to 5 years)	NR	9
	Shouldice	136	Average of 3 years (1 to 5 years)	NR	7
Paul, et al.	Bassini	125	3.3 years	28	10
	Shouldice	119	3.4 years	29	2
Tran, et at.	Bassini	63	2 years	18	14
	Shouldice	65	2 years	18	11
Ferzli, et al.	TEP	100	Average of 12 months (6 to 20 months)	6	0

Payne, et al.	TAPP	52	Average 12 of 10 months (7 to 18 months)	12	0
	Lichtenstein	58	Average of 10 months (7 – 18 months)	18	0

N .R. - Not reported.

SURGICAL COMPLICATIONS OF GROIN HERNIA

Although groin hernia repair is associated with excellent short- and long-term outcomes, complications of the procedure exist and must be recognized.

RECURRENCE

Recurrence of the hernia in the early postoperative setting is rare. When this does occur, it is often secondary to deep infection, undue tension on the repair, or tissue ischemia. Clearly, all of these etiologies raise the concern for a technical complication on the part of the surgeon, either in the handling of the groin tissues or the placement of mesh or suture. The patient who is overactive in the immediate postoperative setting may also be at risk for early hernia recurrence. In this way, it is thought that early exercise is performed before the suture or mesh in the repair has had an opportunity to hold tissue in place and promote scar tissue formation. In the initial postoperative setting, patients may also develop seromas along the planes of dissection as well as fluid in the obliterated hernia sac. These benign consequences of surgery must be differentiated from the more worrisome early recurrence.

Tension is an important, if not the primary, etiology of hernia recurrence. Tissues repaired under undue tension will tend to pull apart, even if sutures or

mesh have been affixed to them. In addition, tension at the site of suture may lead to ischemia at the point where the suture pulls against the tissue, thereby further weakening the hernia repair. Sutures can also cut out or fall apart, especially if placed in a continuous fashion, when tensile force predominates. The role of excessive tissue tension in promotion of hernia recurrence is the basic rationale behind the modern, tension-free and increasingly suture-free hernia repairs advocated by hernia experts such as Lichtenstein and Rutkow.

An emergency operation for strangulated or incarcerated hernia may increase the risk of postoperative recurrence. It is likely that the strangulated hernia, with its inherent inflammation, tissue ischemia, and fascial edema, provides an environment in which the hernia repair is placed either at increased tension or through unhealthy tissue.

A hernia that is overlooked in the operating room represents a potential etiology of hernia recurrence, although this should not be a major concern for the modern hernia surgeon. Most of the repairs in the current era emphasize the repair of both an indirect and direct defect through strengthening of the internal ring and inguinal canal floor, respectively.

A final etiology of hernia recurrence pertains to tobacco use and smoking. The relationship between smoking and hernia formation as well as recurrence was first reported in 1981 and further research has identified proteolytic enzymes that may degrade the connective tissue components.

INFECTION

Infection of the hernia wound or mesh is an uncommon postoperative complication but represents another etiology of hernia recurrence. In specialized hernia practices, the incidence of wound infection following inguinal hernia operation is 1% or less. When an infection does occur, skin flora are the most likely etiology, and appropriate gram-positive antibiotics should be initiated. Patients who undergo mesh placement during groin herniorraphy are at a slightly higher risk of postoperative wound infection. It is often difficult to determine whether the mesh itself is infected or if just the skin or soft tissue anterior to the layer of mesh is infected. However, even if mesh is present, most postoperative groin hernia infections can be treated with aggressive use of antibiotics after the incision is opened and drained expeditiously. Mesh removal in this setting is rarely indicated.

Seromas and hematomas are frequent complications in the postoperative setting. Seromas form in the dead space remaining from a wide dissection during the hernia repair or when fluid fills the distal remnant of the hernia sac. While the sac is often ligated or excised during open herniorraphy, it remains in place following laparoscopic repair, and the filling of the remnant sac with seroma-type fluid has been termed a pseudohernia. This must be differentiated from the more concerning complication of the early recurrent hernia. Defined fluid collections infrequently require drainage or aspiration, as most will reabsorb or drain through the incision on their own.

Hematoma formation must be assiduously avoided during groin hernia repair. This is especially true in the anticoagulated patient, and therefore it is recommended that patients temporarily stop taking aspirin and clopidogrel at least 1 week prior to their operation. Hematoma formation may be minor and lead only to ecchymoses and wound drainage. The ecchymosis often spreads inferiorly into the scrotal plane in a dependent fashion. The hematoma usually resolves in days to weeks following repair and supportive management for pain control including scrotal elevation and warm packs is all that is required. A large volume of hematoma is concerning, as it may serve as a nidus for infection deep in the hernia wound and may risk secondary infection of the prosthetic mesh. Therefore hemostasis at the end of a groin hernia repair is paramount to achieve effective wound healing.

NEURALGIA

Postoperative groin pain, or neuralgia, is common to varying degrees following groin herniorrhaphy. Often, the neuralgia will follow the known distribution of the regional nerves, including the ilioinguinal, iliohypogastric, genital branch of the genitofemoral nerve, and the lateral femorocutaneous nerves. During open hernia repair, the ilioinguinal, iliohypogastric, and the genitofemoral nerves are most commonly injured, while the lateral femorocutaneous nerve is more commonly injured during laparoscopic herniorraphy. Nerve injury is usually due to entrapment of a portion of the nerve in the mesh or suture line placed in one of the soft tissue layers.

Neuralgias can be prevented by meticulously avoiding overt manipulation of the nerves during operative dissection. The ilioinguinal and iliohypogastric nerves are generally injured during elevation of the external oblique fascial flaps, while the genitofemoral nerve is most likely to be injured during the isolation of the cord and stripping of the cremaster muscle fibers. Often, once the nerve branches are identified, they are encircled with a vessel loop and retracted out of the operative field to avoid injury. The nerves can also be intentionally sacrificed at time of surgery. The result of this maneuver is a region of sensory deprivation in the distributions of these nerve structures, namely on the inner upper thigh and the hemiscrotum. However, the sensory deprivation is thought to be better tolerated by the patient than the chronic and persistent pain attributed to nerve entrapment in

scar or mesh. In laparoscopic repair, nerve injury can be prevented by avoiding tack or staple placement below the iliopubic tract.

Neuralgia should first be managed conservatively, with attempts at local anesthetic injection in the affected groin. When local anesthesia is injected along the known course of a nerve, this modality may serve as both a diagnostic and therapeutic maneuver. In some cases, temporary control of the chronic pain with local anesthesia may reduce or altogether eliminate the sequelae of chronic groin pain. When this conservative approach does not succeed, groin re-exploration can be performed to ligate or excise affected nerve branches. This is clearly not the preferred first option, since the groin wound has abundant scar and previously undamaged nerve structures may be placed at additional risk. Occasionally, patients will present with postoperative neuralgia that does not match the distribution of any known inguinal nerve. Groin re-exploration should be avoided in this case since it is unlikely to ameliorate the pain and may damage additional structures.

Nerve injury during laparoscopic repair can occur during the tacking of the mesh to the anterior abdominal wall. Tacks should be avoided in the known areas of nerve structures. Some surgeons prefer to not place any tacking staples at all when performing laparoscopic herniorraphy to avoid this complication altogether.

BLADDER INJURY

The urinary bladder may be inadvertently injured during dissection of a direct inguinal hernia sac, but only rarely during repair of an indirect defect. The bladder can also participate in a sliding hernia, so that a portion of the bladder wall is adherent to the sac in a direct defect. Because of the potential for this complication, direct sacs should be inverted into the peritoneal cavity so that excessive dissection can be avoided. If bladder injury takes place, the sac should be opened, and the bladder injury repaired in two layers of an absorbable suture. In general, a urethral catheter is placed for a minimum of 7-14 days.

TESTICULAR INJURY

Testicular swelling and atrophy is seen after inguinal hernia repair. Edema of the scrotum or testis may be secondary to edema or hematoma of the inguinal canal that tracks inferomedially to the scrotum in a dependent fashion. Alternatively, a tender testicle or an atrophic testicle may be secondary to injury to the blood supply to the genitals during dissection and isolation of the cord. In most cases, this is not an emergency in the adult patient, and the testes will atrophy without significant infectious complications so that orchiectomy is rarely necessary. A testicle that is tender on examination may require ultrasonographic imaging to rule out testicular torsion or a corresponding abscess. Necrosis of the testes, a very rare complication of groin hernia repair, usually requires orchiectomy to avoid infectious complications.

VAS DEFERENS INJURY

Injury to the vas is a rare complication of groin hernia surgery in the male patient. Transection of the vas is the most serious form of this injury; this requires urologic consultation and likely immediate reanastomosis in the child or young adult, but may only require ligation of both ends in the older adult patient. The most worrisome sequela of vas deferens obstruction or transection is formation of anti-sperm antibodies in the serum, leading to infertility.

PROSTHETIC MATERIALS IN HERNIOPLASTY

Biological	:	Tensor fascia lata
		Temporal fascia
		Skin
Synthetic	:	Polypropylene mesh
		Polyester mesh
		expanded Polytetrafluroethylene (e – PTFE) patches

Less dense, lighter weight, larger pore size mesh, will result in less inflammation, better incorporation, better abdominal wall compliance, possibly less scar contraction, greater abdominal wall flexibility, less pain and therefore a better clinical outcome.

Ideal biomaterial for hernia repair has likely not yet been developed. Criteria for an ideal implantable prosthetic biomaterial is as follows.

- The material should not be physically modified by tissue fluids

- should be chemically inert.

- should not excite an inflammatory or foreign body reaction.

- should be noncarcinogenic.

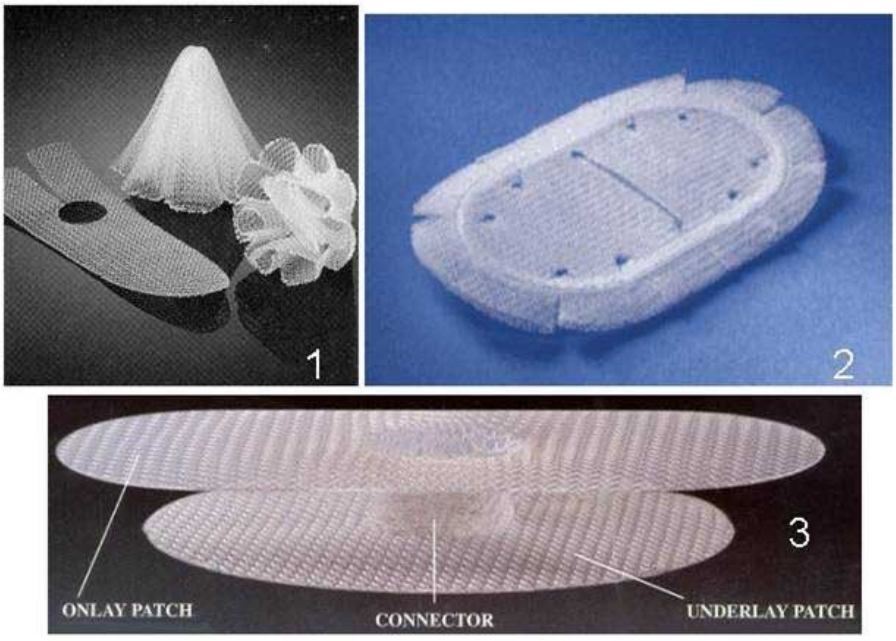
- should not produce a state of allergy or hypersensitivity.

- should be capable of resisting mechanical strains.

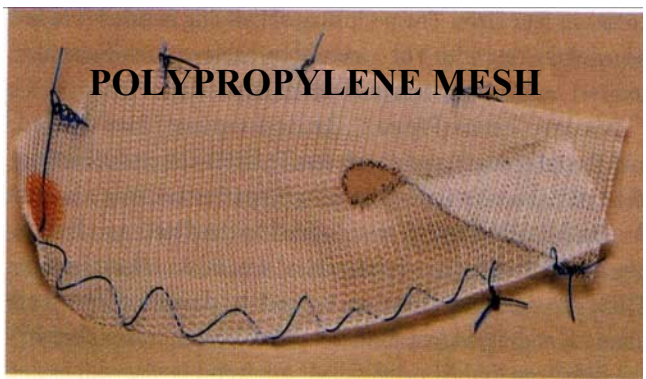
- should be capable of being fabricated in the form required.

- should be capable of being sterilized.

TYPES OF MESH



1. Plug & patch 2. Kugel patch 3.Prolene hernia system



One of the welcomed aspects of reviewing the data in the mesh area, is that we are finally beginning to see some reasonable advent of science in approaching mesh problems. These are in four areas.

1. The mesh being eternal versus disintegrating.
2. Shrinkage and the relationship of shrinkage to pore sizes or other measurements.
3. the relationship between integrity and in growth.
4. Resistance to infection.

MATERIALS AND METHODS

This study includes 186 patients with inguinal hernias treated with mesh repair from August 2006 in TVMCH by both laparoscopic and open method done electively.

PATIENTS SELECTION

Adults (above 18 yrs of age) , both gender with inguinal hernia were included in the study.

Patients presenting in emergency and those with age less than 18 years were excluded, as they did not undergo Mesh Hernioplasty.

METHODOLOGY

- Patients with symptoms like chronic cough and constipation, and those with conditions like anaemia,diabetes and hypertension were optimized before surgery.
- Anaesthesia fitness was taken after necessary investigations.
- Pre operative antibiotics given in the form of Inj.Ampicillin 1 gm IV at the time of induction of anaesthesia.
- Patients were mostly operated under Regional (Spinal) anaesthesia.
- Data was collected on a pre-designed proforma.
- Out patient follow-up was done for 6 months as a minimum and a maximum of 30 months.

ANAESTHESIA

- Patients were seen in the pre-anaesthesia clinic and surgery was carried out after fitness

- General anaesthesia was given for laparoscopic surgeries
- Rest were given regional anaesthesia
- Day care surgery was not done –not accepted by patients.

SURGICAL TECHNIQUE

- Standard open technique as described by Lichtenstein was used for both direct and indirect hernial sacs.

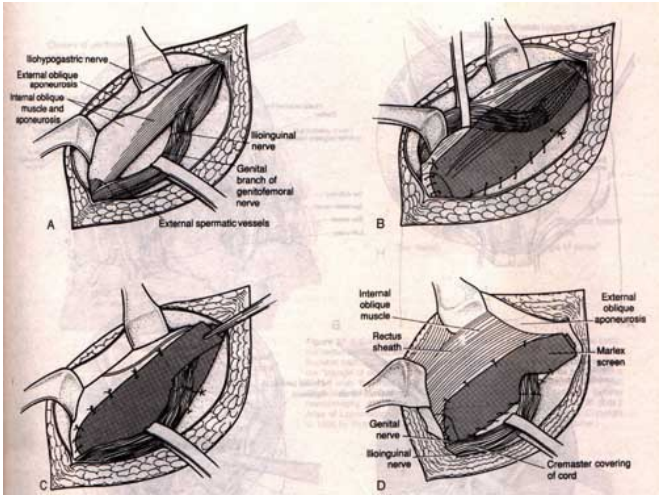
- Size of the mesh is chosen according to the size of the defect so that the mesh is extending approximately 2 cm medial to the pubic tubercle, 3-4 cm above the Hesselbach triangle,and 5-6 cm lateral to the internal ring to account for mesh shrinkage.

- The corners of the polypropylene mesh (6 x 11cms) size were trimmed and a slit, nearly half the length of the mesh,was created for the cord to go through.

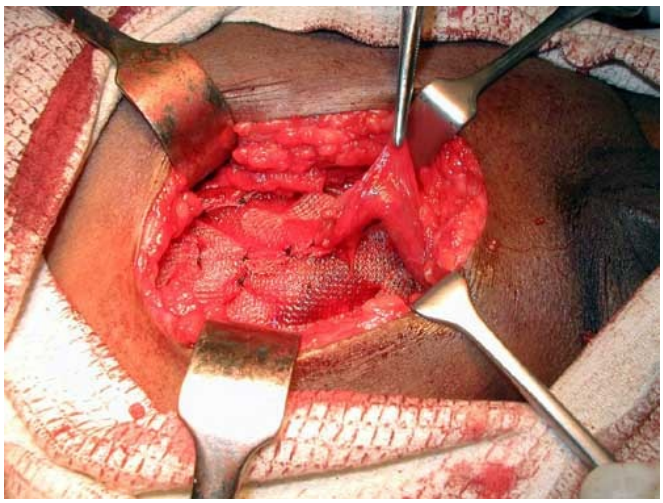
- The lower edge of the mesh was anchored to the inguinal ligament with 2/0 polypropylene in a continuous manner starting at the pubic tubercle and ending just beyond a coincident point past the level of the deep ring.

- The mesh was next anchored by 3 to 4 interrupted stitches to the conjoint tendon and internal oblique muscle.

LICHTENSTEIN REPAIR



MESH REPAIR



- The upper leaf of the mesh is the pulled over the lower leaf like a double breast coat and the lower edge of the upper leaf and lower edge of the lower leaf together were stitched with 2/0 polypropylene to the inguinal ligament.

- Care was taken that the opening, the “new” deep ring, from where the spermatic cord passed was optimally snugged; this was tested by trying to get the tip of the little finger in.

- Haemostasis was secured and external oblique closed with 2 0’ chromic suture. As a routine no drain was placed. Skin was closed with 1 0 ‘silk interrupted sutures.

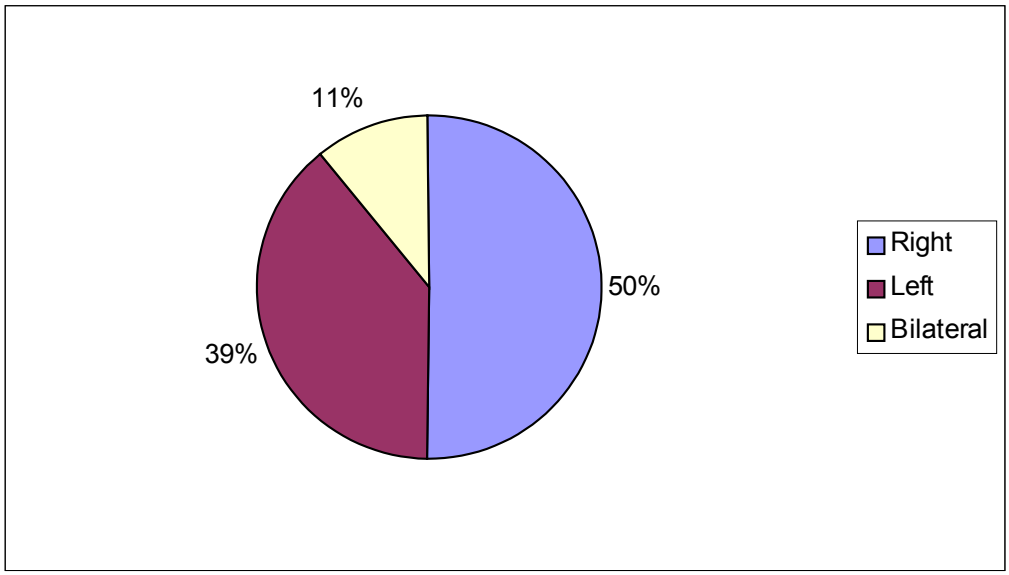
OBSERVATION

Side	Number	Percentage
Right	93	50
Left	73	39.2
Bilateral	20	10.8
Total	186	100

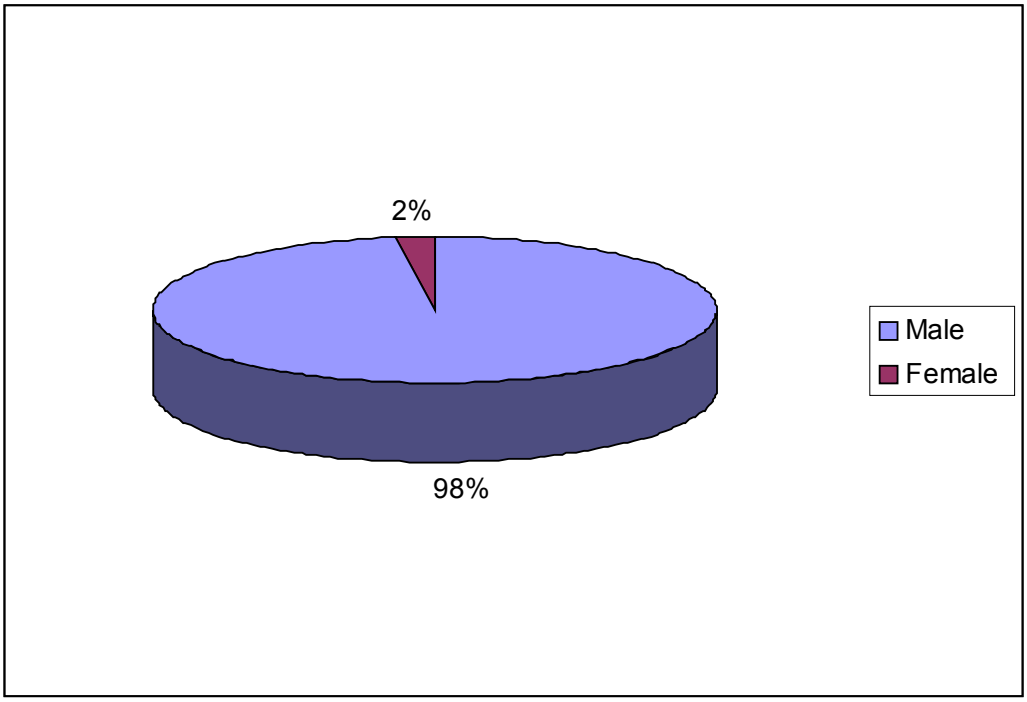
NYHUS CLASSIFICATION

TYPE	NO. OF CASES
II	30
III a	108
III b	46
III c	NIL
IV	22

INGUINAL HERNIA



SEX INCIDENCE

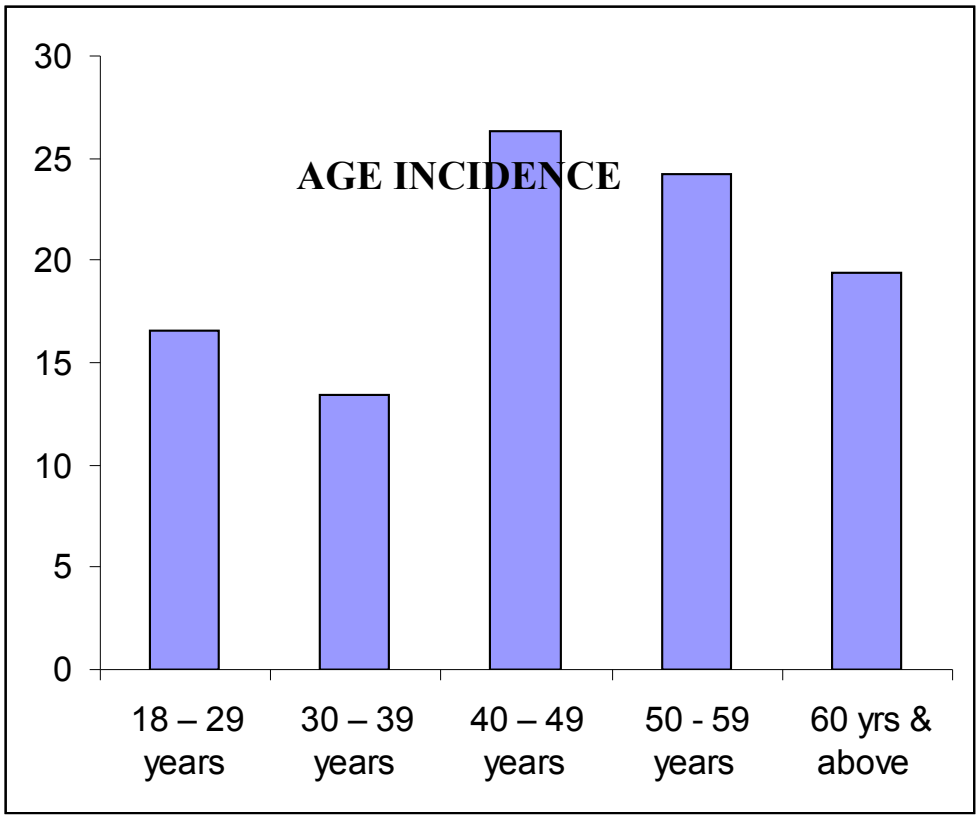


AGE INCIDENCE

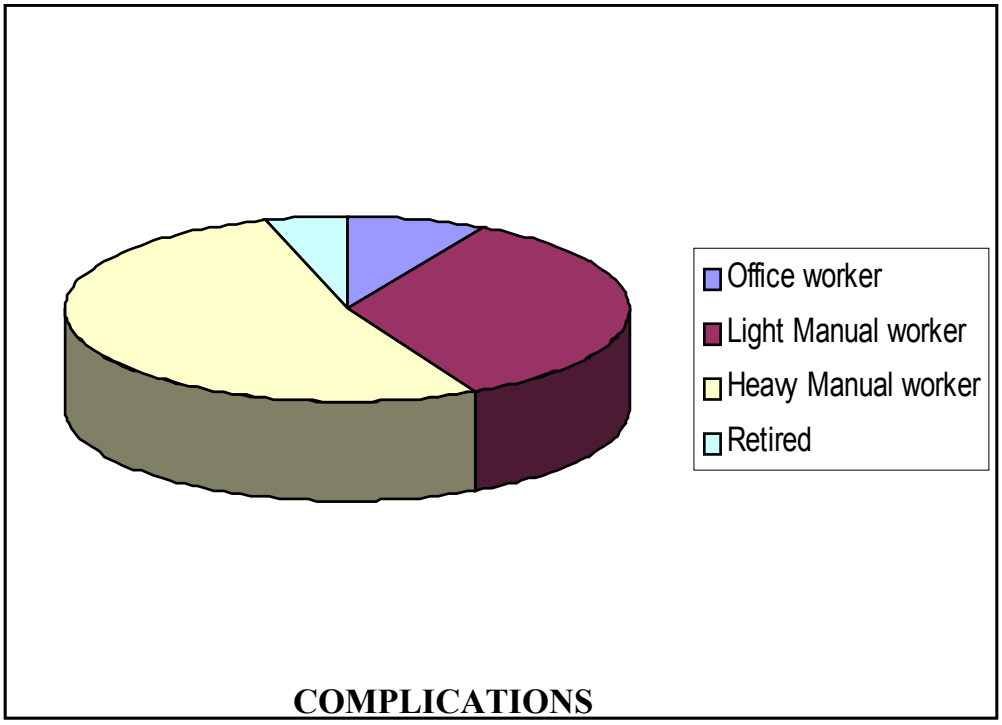
Age Group	Number	%
18 – 29 years	31	16.6
30 – 39 years	25	13.4
40 – 49 years	49	26.3
50 – 59 years	45	24.2
60 yrs & above	36	19,4

OCCUPATION

Occupation	No.	%
Office worker	15	8
Light Manual worker	64	34.4
Heavy Manual worker	98	52.7
Retired	9	4.8



OCCUPATION



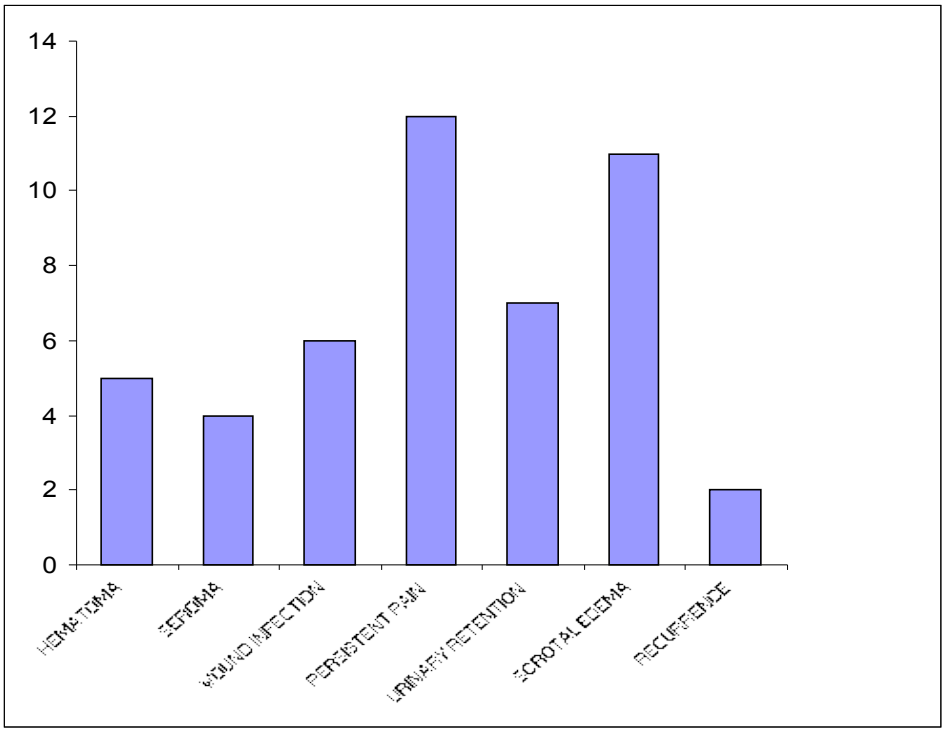
COMPLICATIONS

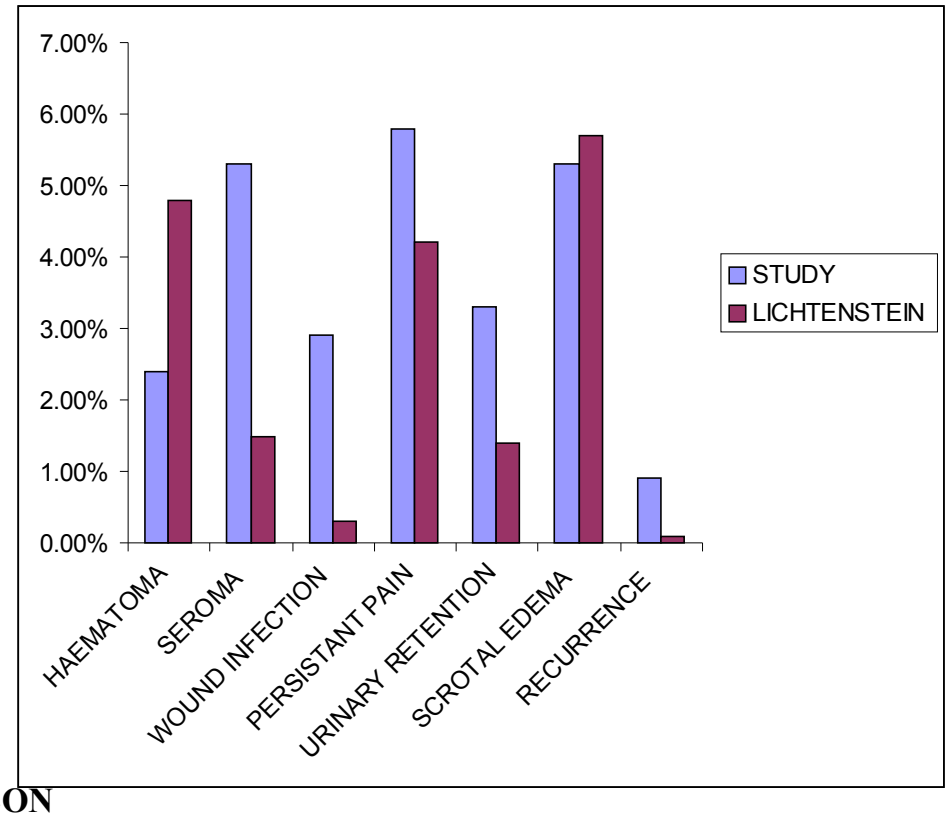
HEMATOMA	5 (2.4%)
SEROMA	11 (5.3%)
WOUND INFECTION	6 (2.9%)
PERSISTENT PAIN	12 (5.8%)

URINARY RETENTION	7 (3.3%)
SCROTAL EDEMA	11 (5.3%)
RECURRENCE	2 (0.97%)

	STUDY	**LICHTENSTEIN**
HAEMATOMA	2.4%	4.8%
SEROMA	5.3%	1.5%
WOUND INFECTION	2.9%	0.3%
PERSISTANT PAIN	5.8%	4.2%
URINARY RETENTION	3.3%	1.4%
SCROTAL EDEMA	5.3%	5.7%
RECURRENCE	0.9%	0.1%

COMPLICATIONS





SURGEON

The categorization of the surgeons performing the surgery, depicted

- **Category-A**=Consultants with surgical experience of >10 more years.(Professors and Associate Professors)
- **Category-B**=Consultants with surgical experience of >5 years. (Assistant Professors and Senior Registrars)
- **Category-C**= PGs with less than 3 years experience.
- **Category-D**=House Officers

SURGEON

CATEGORY	NUMBER	PERCENT
CATEGORY A	12	6
CATEGORY B	46	22
CATEGORY C	148	72

RESULTS

- A total of 186 patients with (206 hernias) 20 patients(10.8%) had bilateral herniae.
- 182 patients (97.8%) were males and 4 patients(2.2%) were females.
- 73 patients (39.2%) of our patients had hernia on the left side.
- 93 patients (50%) on the right side.
- The ages of the patients ranged from 18 to 75 years; majority (80%) were under the age of 60 years.

- Trainee surgeons did 70% of the operations.
- Average duration of surgery : Open -50 min (30 -100min)

  Lap - 90 min(60 -140min)
- Laparoscopic surgeries – 8

  TAPP -3

  TEP -5
- No complication in Laparoscopic surgery group.
- Return to work -15 days(8 -30 days).
- Return to Hard work – 3 months(2 -8 months).
- No mortality in this study.

DISCUSSION

Since Lichtenstein and Shulman published their paper "Ambulatory outpatient hernia surgery, including a new concept, introducing tension free repair" in 1986 and then in 1987 Lichtenstein published his findings on the simple yet effective method of using polypropylene mesh for the repair of 6321 inguinal hernias, surgeons all over the world have adopted the method and reproduced similar results. Kark et al, Gourgiotis et al and Neumayer et al showed the ease and flexibility which the tension free repair had to offer by their results.

In our series of 206 patients, majority (80%) were under the age of 60 years, thus still active in their respective professions and early return to work was of paramount importance to them. More than Eighty percent of patients were manual workers and daily wage earners, hence ambulation was the immediate concern. The Lichtenstein's technique does facilitate early ambulation and early return to work.

Our series showed that nearly 70% operations were performed by trainee surgeons and the rest by consultants. Initially all the trainees were supervised directly and asked to follow the standard described technique. Although not directly recorded but the general impression was that the learning curve was steep and efficiency increased over time. Hernias initially thought to be "difficult" by the trainees, were over time more easily dealt by them and with less direct supervision. Chan et al in their study described similar findings, that trainee surgeons acquired the skills easily.

We generally did not use drains, unless the hernia was significantly large. Out of the 206 hernias 40 hernias had drains in the form of closed suction drain.

Five cases developed haematoma which presented in the early postoperative period, four of them settled over a period of 5-8 days but one needed evacuation under anaesthesia.Out of 5 cases of haematoma, 4 cases belong to non-DT group.

Out of the 11 seromas developed, 8 cases settled on conservative management, 3 cases needed needle aspiration.All cases of seroma belong to non-DT group.

Seven patients with urinary retention had to be catheterized for a period of 24 hours in the early post operative period.

Superficial wound infection was seen in six cases which settled with regular dressings and antibiotics. These results are comparable with those of Choudry et al, Majeed and Mehmood and Ahmad et al, although the latter used a Redivac suction drain and continued oral antibiotics after three doses of intravenous antibiotics. Najamulhaq and colleagues reported a 3% wound infection in their series, without the use of prophylactic antibiotics.

11 cases developed scrotal edema and all were treated with antibiotics and scrotal support.

12 patients had Persistent pain which is an evolving significant side effect of mesh hernioplasty.

Shulman and Lichtenstein in their follow-up study in 1995 showed that 72 European and American general surgeons with no special interest in hernia repairs, using their technique in 16,068 operations had a recurrence rate under 0.5%. We had only two (0.97%) recurrences out of 206 hernias repaired.

One patient was a known PT patient (completed ATT before surgery) and smoker, with a large irreducible hernia and he developed recurrence 1 year after surgery. Second patient was a known asthmatic and he developed recurrence 5 months postoperatively. Both were re-operated and are currently followed-up in the OPD.

Our recurrence rate of 0.97% is comparable to that of Choudry et al (1.2%) and, Farooq and Rehman et al (1.5%). Other authors like Kark et al and Sakorafas et al with large series (>500 cases) showed a recurrence rate of less than 1% and this should be the aim of our hernia repairs.

CONCLUSION

- MESH Hernioplasty is an internationally proven safe technique.
- In our local setup it has been proved effective with low complication and recurrence rates.
- It is a procedure which is easily learnt by the trainee surgeons.
- Our recurrence rate is comparable equally with that of sophisticated hernia centres abroad.

BIBLIOGRAPHY

1. Maingot's abdominal operations (11th edition)
2. Schwartz's principles of surgery (eighth edition)
3. Sabiston Text book of surgery (1st edition)
4. Scandalaky's surgical anatomy.
5. Mastery of surgery by Fischer (5th edition).
6. Dorairajan N. Inguinal Hernia-yesterday, today and tomorrow. Indian J Surg 2004; 66:137-139.
7. Lichenstein IL. Hernia Repair without Disability.St. Louis: The C.V. Mosby Company; 1970. p.1-8.
8. Bassini E. Sulla cura radicale dell Hernia Inguinale**.** Arch Soc Ital Chir 1887; 4: 380-388.
9. Shouldice EE. The treatment of the Hernia. Ontario Med Rev 1953; 1: 1-14.
10. Oonwala ZG. Inguinal Hernia Repair: Past & Present. Pak J Surg 2005; 21(2): 54-55.
11. Nyhus LM. The posterior (preperitoneal) approach and ilio-pubic tract repair of Inguinal and Femoral Hernias: An update. Hernia 2003; 7: 63-67.
12. DeBord JR. Prostheses in Hernia surgery: A century of evolution. In: Ben David R, Abrahamson J, Arregui MF, eds. Abdominal wall Hernias. New York: Springer; 2001. p.16-32.
13. Lichenstein IL, Shulman AG. Ambulatory outpatient Hernia surgery, including a new concept, introducing tension free repair. Int Surg 1986; 71: 1-7.

14. Stoppa RE. The midline preperitoneal approach and prosthetic repair of groin Hernias. In: Fitzgibbons RJ, Greenburg AG, eds. Nyhus and Condon's Hernia, 5th ed. Philadelphia: Lippincott, Williams & Wilkins; 2002. p.199-214.
15. Gilbert AI. Improved sutureless technique: Advice to experts. Prob Gen Surg 1995; 12: 117-9.
16. Fasih T, Mahapatra TK, Waddington RT. Early results of Inguinal Hernia repair by the 'mesh plug' technique - first 200 cases. Ann R Coll Surg Engl 2000 Nov; 82(6): 396-400.
17. Felix EL, Michas CA, McKnight RL. Laparoscopic herniorrhaphy transabdominal preperitoneal floor repair. Surg Endosc 1994; 8: 103-4.
18. Heithold DL, Ramshaw BJ, Mason EM, et al. 500 Total extraperitoneal approach Laparoscopic Herniorrhaphies: A single institution review. Am Surg 1997; 63:299-301.
19. Sylopoulos N, Gazelle GS, Rattner DW. A cost utility analysis of treatment options for Inguinal Hernias in 1,513,000 adult patients: Randomized controlled studies. Surg Endosc 2003; 17: 180-9.
20. Desarda MP. Physiological repair of Inguinal Hernia: A new technique (study of 860 patients). Hernia 2006; 10(2): 143-144.
21. Nelson M, Stephenson BN. Adult groin Hernias: Acute and elective. Surgery 2006; 74: 239-245.
22. Lichenstein IL. Herniorrhaphy: A personal experience with 6321 cases. Am J Surg 1987;153: 553-9.

23. Kark AE, Kurzer M, Waters KJ. Tension free mesh Hernia repair: Review of 1098 cases using local anaesthesia in a day unit. Ann Roy Coll Surg Eng 1995; 77: 299-304.

24. Gourgiotis S, Germanos S, Stratopoulos C, Moustafellos P, Panteli A, Hadjiyannakis E. Lichtenstein tension-free repair of Inguinal Hernia. Chirurgia (Bucur) 2006 Sep-Oct; 101(5): 509-12.

25. Neumayer L, Globbie-Hunder A, Jonasson O, et al. Open mesh repair of Inguinal Hernia. N Engl J Med 2004; 350: 1819-27.

26. Shulman AG, Amid PK, Lichtenstein IL**.** A survey of non-expert surgeons using the open tension-free mesh patch repair for primary Inguinal Hernias. Int Surg 1995 Jan-Mar; 80(1): 35-6.

27. Chan KY, Rohaizak M, Sukumar N, Shaharuddin

28. S, Jasmi AY. Inguinal Hernia repair by surgical trainees at a Malysian teaching hospital. Asian J Surg 2004 Oct; 27(4): 306-312.

29. Choudry ZA, Khan SA, Islam HR, Siddique T, Malik JI. Lichtenstien repair of Inguinal Hernia under local anesthesia - day case surgery. Ann King Edward Med Coll 2005; 11(4): 367-9.

30. Majeed S, Mehmood K. Repair of Inguinal Hernias with Lichtenstein technique. Pak Armed Forces Med J 2005; 55(2): 95-8.

31. Ahmad M, Qayum A, Afridi V. Tension free Hernioplasty is safe and effective. Pak J Surg 2005 Dec; 21(2): 76-80.

32. Najamulhaq R, Chaudhry IA, Khan BA, Afzal M. Groin sepsis following Lichtenstein Inguinal Hernioplasty without antibiotics prophylaxis: A review of 100 cases. Pak J Med Sci 2006; 22(4): 416-9.

33. Farooq O, Rehman B. Recurrent Inguinal Hernia repair by open preperitoneal approach. J Coll Physicians Surg Pak 2005; 15(5): 261-5.

34. Sakorafas GH, Halikias I, Nissotakis C, Kotsifopoulos N, Stavrou A, Antonopoulos C. Open tension free repair of Inguinal Hernias; The Lichtenstein technique. Biomedical Central Surg 2001; 1: 3. 117

35. Mesh Hernioplasty Shams Nadeem Alam, Shah Mohammed, Obaidullah Khan, S. Manzar Volume 23, Issue 2, 2007

PROFORMA
MESH HERNIOPLASTY

NAME :

AGE :

SEX :

IP NO :

OCCUPATION :

NYHUS TYPE

TYPE OF GROIN HERNIA : ☐ I ☐ II ☐ IIIA ☐ IIIB ☐ IIIC ☐ IV

TYPE OF SURGERY : ☐ OPEN

☐ MINIMALLY INVASIVE SURGERY

TYPE OF MESH : Synthetic Non – absorbable

SUTURE MATERIAL : Prolene 2 0' Interrupted sutures.

ANAESTHESIA : ☐ LOCAL

☐ REGIONAL

INGUINAL HERNIA :INTERNAL RING SIZE :
POSTERIOR WALL DEFECT :
MESH SIZE :

DURATION OF SURGERY:

☐ NO DRAIN

DRAIN

☐ DRAIN TYPE ☐ Closed

☐ Open

	<10CC	10- 30	30-50	>50CC
QUANTITY : DAY 1 :	☐	☐	☐	☐
DAY 2 :	☐	☐	☐	☐
DAY 3	☐	☐	☐	☐

DAY 4 : ☐ ☐ ☐ ☐

> 4 DAYS : ☐ ☐ ☐ ☐

DRAIN REMOVAL :

ANALGESIA : ☐ Mild Pain (No Analgesics)

☐ Moderate Pain (Inj. diclofenac 2CC IM)

☐ Severe pain (Inj. Fortwin ICC IM)

ANTIBIOTICS : ☐ Inj. Ampicillin + Inj. Gentamycin

☐ Inj. Cefotaxime

SUTURE REMOVAL :

COMPLICATIONS : ☐ Haematoma

☐ Seroma

☐ Wound Infection

☐ Persistant Pain

☐ Urinary Retention

☐ Scrotal Edema

☐ Recurrence.

RETURN TO WORK :

HARD WORK :

MASTER CHART

S.No.	Name	Age	Sex	IP.No.	Side	Nyhus Type	Surgery
1.	Selvam	37	M	24157	Bilateral	II, III A	Lap TEP
2.	Sivasubramanian	49	M	16152	Left	III A	Lap TAPP
3.	Murugan	33	M	14079	Left	III A	Lap TEP
4.	Sasidharan	48	M	36592	Right	III A	Lap TEP
5.	Arumugam	22	M	39405	Left	III B	Lap TAPP
6.	Tangaraj	44	M	40545	Right	III A	Lap TAPP
7.	Raja	47	M	18053	Right	III B	Lap TEP
8.	Chellappa	73	M	50058	Right	III B	Open
9.	Mayilan	55	M	52120	Right	III B	Open
10.	Selvaraj	70	M	58182	Right	IV	Open
11.	Nathan	52	M	58201	Left	III A	Open
12.	Mariappan	60	M	60154	Right	IV	Open
13.	Vellapandi	51	M	3507	Bilateral	III A, III A	Open
14.	Alagumuthu	45	M	3015	Right	III A	Open
15.	Susai	57	M	31795	Bilateral	III B, III A	Open
16.	Mani	63	M	33513	Right	IV	Open
17.	Arumugam	65	M	33535	Bilateral	III A III B	Open
18.	Thirumalai	51	M	33501	Right	III A	Open
19.	Sattadurai	53	M	35469	Left	III A	Open
20.	John Natarajan	50	M	35467	Right	III B	Open
21.	Anwar	42	M	35542	Left	III A	Open
22.	Subramanian	49	M	38016	Bilateral	II, III B	Open
23.	Shanmugavel	39	M	38497	Bilateral	II, III B	Open
24.	Dulacimani	68	M	38388	Right	IV	Open
25.	Valli	48	M	38393	Bilateral	III A,	Open

						III A	
26.	Sornam	31	F	39478	Right	II	Open
27.	Maharaja	20	M	39463	Left	II	Open
28.	Sahul Hameed	70	M	39424	Left	III B	Open
29.	Senthurpandi	52	M	40467	Left	III A	Open
30.	Olimuthu	39	M	40612	Bilateral	II, III B	Open
31.	Murugan	43	M	7819	Left	IV	Open
32.	Sudalaimuthu	64	M	14925	Right	IV	Open
33.	Ponraj	31	M	29550	Left	II	Open
34.	Anbazhagan	27	M	29516	Right	II	Open
35.	Peer Maideen	42	M	29507	Left	III B	Open
36.	Nagaraj	30	M	31120	Right	III A	Open
37.	Petchiammal	60	F	29508	Right	III A	Open
38.	Karupasamy	19	M	28524	Right	II	Open
39.	Ramraj	62	M	24477	Left	IV	Open
40.	Appadurai	47	M	26361	Right	III A	Open
41.	Sorimuthu	22	M	25524	Right	III B	Open
42.	Ganapathy	55	M	25261	Right	II	Open
43.	Daniel	19	M	24254	Right	III B	Open
44.	Subashini	19	F	24524	Left	II	Open
45.	Ganapathy	44	M	22965	Left	III A	Open
46.	Selvaraj	51	M	23006	Right	IV	Open
47.	Ramachandran	24	M	22974	Right	II	Open
48.	Muniandy	60	M	21763	Left	IV	Open
49.	Esakki	35	M	21787	Right	III A	Open
50.	Arunachalam	67	M	21804	Right	III A	Open
51.	Muthukrishnan	28	M	19223	Left	IV	Open
52.	Pandiraj	52	M	19227	Right	III A	Open
53.	Rajendran	45	M	19265	Right	III A	Open
54.	Iyyappan	27	M	18432	Right	III A	Open
55.	Arumugam	44	M	16256	Bilateral	II, III B	Open
56.	Gopi	28	M	17282	Right	III A	Open
57.	Murugesan	55	M	14082	Left	IV	Open
58.	Sasidharan	55	M	12357	Right	III A	Open
59.	Shanmugavel	54	M	12403	Right	III A	Open
60.	Chinnandi	49	M	2389	Left	III A	Open
61.	Ramesh	40	M	13990	Left	III A	Open
62.	Shanmugam	36	M	10888	Left	III A	Open

63.	Samuthiram	43	M	10549	Right	III A	Open
64.	Muhaideen Pitchai	54	M	4377	Right	III B	Open
65.	Balakrishnan	59	M	4524	Left	III A	Open
0066.	Mani	55	M	8887	Right	III A	Open
67.	Aexander	36	M	6635	Left	III A	Open
68.	Paramasivan	65	M	6609	Right	III B	Open
69.	Abusali	34	M	7784	Right	III A	Open
70.	Maharajan	52	M	8906	Left	IV	Open
71.	Lakshmanan	23	M	8829	Left	II	Open
72.	Kadhar Mydeen	45	M	8854	Right	III B	Open
73.	Swamidhas	60	M	2043	Right	III A	Open
74.	Shanmugam	45	M	2033	Bilateral	III A, III A	Open
75.	Abdul kadhar	52	M	112	Right	III A	Open
76.	Ramaiah	81	M	110	Right	III B	Open
77.	Chinnadurai	26	M	115	Right	III A	Open
78.	Murugaperumal	34	M	134	Left	IV	Open
79.	Sankaraiya	60	M	50152	Left	III A	Open
80.	Chinnadurai	52	M	49112	Right	III A	Open
81.	Alagusundaram	58	M	49153	Left	III A	Open
82.	Nambirajan	38	M	41611	Right	III B	Open
83.	Madasamy	24	M	47988	Right	II	Open
84.	Seyed Ali	30	M	49230	Right	III A	Open
85.	Gomathi Nayagam	23	M	49232	Left	II	Open
86.	Rajakhan	54	M	52339	Right	IV	Open
87.	James	50	M	29161	Right	III A	Open
88.	Saminathan	40	M	5003	Left	III B	Open
89.	Sudalaimani	50	M	4998	Left	III A	Open
90.	Kombaiah	42	M	45959	Left	III A	Open
91.	Sakthivel	58	M	45972	Right	III A	Open
92.	Kalimuthu	62	M	45146	Right	III A	Open
93.	Ramanathan	24	M	43160	Right	III B	Open
94.	Karuppasamy	63	M	42194	Right	III A	Open
95.	Varatharajaperumal	38	M	41218	Right	III A	Open
96.	Selvaraj	49	M	41204	Right	III A	Open
97.	Ilayaraja	26	M	41203	Left	III B	Open
98.	Pandiraj	40	M	40962	Left	III A	Open
99.	Sreenivasan	70	M	39017	Left	III A	Open
100.	Ganapathy	58	M	39005	Bilateral	III A, III A	Open

101.	Arumugaraj	26	M	7802	Right	III B	Open
102.	Sudalaimuthu	50	M	7846	Left	III A	Open
103.	Kalyani	35	M	7792	Right	III A	Open
104.	Balaiah	60	M	9034	Right	IV	Open
105.	Arumugam	47	M	10029	Right	III A	Open
106.	Mupidathy	35	M	11007	Right	III B	Open
107.	Jeyaseelan	48	M	10952	Bilateral	III A, III A	Open
108.	Duraipandi	50	M	12022	Right	III A	Open
109.	Dharmaraj	30	M	13608	Left	III A	Open
110.	Murugan	40	M	13659	Left	IV	Open
111.	Annamalai	53	M	13978	Left	III A	Open
112.	Pungathudaiyan	42	M	14911	Right	III A	Open
113.	Sabari	41	M	14880	Right	III B	Open
114.	Rajan	40	M	14941	Right	III A	Open
115.	Sivaraman	20	M	17897	Left	II	Open
116.	Murugan	60	M	17016	Left	III A	Open
117.	Muniandi	47	M	18911	Bilateral	II, III B	Open
118.	Kandasamy	35	M	20083	Right	III A	Open
119.	Poolpandi	50	M	20053	Left	III A	Open
120.	Balasubramanian	67	M	20766	Right	IV	Open
121.	Paramasivam	64	M	21084	Right	III A	Open
122.	Kanagaraj	25	M	20064	Left	III A	Open
123.	Velukonar	65	M	22048	Left	III B	Open
124.	Thagakrishnan	19	M	22032	Right	II	Open
125.	Kumar	28	M	22823	Right	III A	Open
126.	Subramanian	57	M	17882	Right	III A	Open
127.	Senthil kumar	23	M	27854	Right	III A	Open
128.	Kasipandi	39	M	26790	Right	III B	Open
129.	Arumugakonar	60	M	24769	Left	III A	Open
130.	Sudalaiandi	50	M	250807	Right	III A	Open
131.	Daniel	52	M	24827	Left	IV	Open
132.	Subramanian	57	M	27932	Right	III A	Open
133.	Subbiah	65	M	29001	Left	III B	Open
134.	Mupidathy	34	M	27786	Right	III A	Open
135.	Soosai	57	M	29050	Right	IV	Open
136.	Sundararajan	47	M	29006	Right	III A	Open
137.	Mariappan	42	M	28956	Right	III A	Open
138.	Selvaraj	34	M	29059	Left	III A	Open

139.	Venkatramani	52	M	31020	Right	III A	Open
140.	Kali	41	M	31025	Left	III B	Open
141.	Arasupandian	23	M	31931	Right	III A	Open
142.	Siva	26	M	32938	Right	IV	Open
143.	Sudalairaj	26	M	32947	Left	II	Open
144.	Pauldurai	45	M	32980	Left	III A	Open
145.	Mohan	46	M	32961	Left	III A	Open
146.	Andiappan	51	M	32950	Left	III A	Open
147.	Ganesan	55	M	32956	Left	III B	Open
148.	Poomani	59	M	48114	Right	III A	Open
149.	Muthuselvam	26	M	34013	Right	IV	Open
150.	Dharmalingam	39	M	34945	Bilateral	II, III B	Open
151.	Paramasivan	51	M	12552	Right	III A	Open
152.	Nallamuthu	43	M	26793	Left	III A	Open
153.	Rajendran	48	M	37001	Left	III A	Open
154.	Shanmugavel	60	M	13331	Right	III B	Open
155.	Puthiyavan	43	M	36082	Left	III A	Open
156.	Vaithiyanathan	68	M	12492	Right	III A	Open
157	Manikandan	48	M	12890	Left	III A	Open
158.	Jeganathan	36	M	23325	Left	III B	Open
159.	Balasubramaniam	53	M	21247	Right	III A	Open
160.	Pushpam	40	F	4042	Left	III A	Open
161.	Veeramani	57	M	34955	Left	III B	Open
162.	Murugan	19	M	37003	Right	II	Open
163.	Mundasamy	22	M	35955	Right	II	Open
164.	Kumar	25	M	37885	Right	II	Open
165.	Nainar	45	M	37878	Left	III B	Open
166.	Aruvathimoovar	63	M	27446	Bilateral	II, IIIB	Open
167.	Bala	55	M	24184	Left	III A	Open
168.	Mariappan	48	M	22933	Left	IV	Open
169.	Kesavan	48	M	31036	Bilateral	III A, III A	Open
170.	Ponraj	60	M	48166	Left	III A	Open
171.	Palani	60	M	3119	Left	III A	Open
172.	Paulraj	43	M	25816	Right	III B	Open

173.	Narayanasamy	75	M	24790	Left	III B	Open
174.	Abraham	40	M	10029	Left	III A	Open
175.	Ramachandran	71	M	9016	Bilateral	II, III B	Open
176.	Solomon	27	M	896	Bilateral	II, IIIA	Open
177.	Shanmugasundaram	45	M	7840	Left	III B	Open
178.	Mydeen	41	M	26743	Left	III A	Open
179.	Chinnappan	65	M	12168	Right	III B	Open
180.	Mayandi	53	M	59292	Bilateral	II, III B	Open
181.	Kutty	40	M	27783	Left	III A	Open
182.	Esakki	53	M	14225	Right	III A	Open
183.	Ramanujam	70	M	47084	Bilateral	II, III B	Open
184.	Ganapathipillai	48	M	22205	Left	III A	Open
185.	Muthu	60	M	3129	Right	III B	Open
186.	Murugan	33	M	26850	Left	II	Open.